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Addair

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[54] **MATTRESS EXERCISE APPARATUS**

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[52] **U.S. Cl.** **272/126;** 5/445

[58] **Field of Search** ..... 272/135–139, 272/144, 126, 900; 5/445, 496, 498, 508, 494, 466; 128/DIG. 15, 134, 25 R

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[57] **ABSTRACT**

Exercise apparatus adapted to be detachably installed on a mattress without having to adapt or alter the construction of the mattress or bed frame carrying the mattress. The apparatus is readily utilized by an individual reclining on the mattress.

7 Claims, 3 Drawing Figures

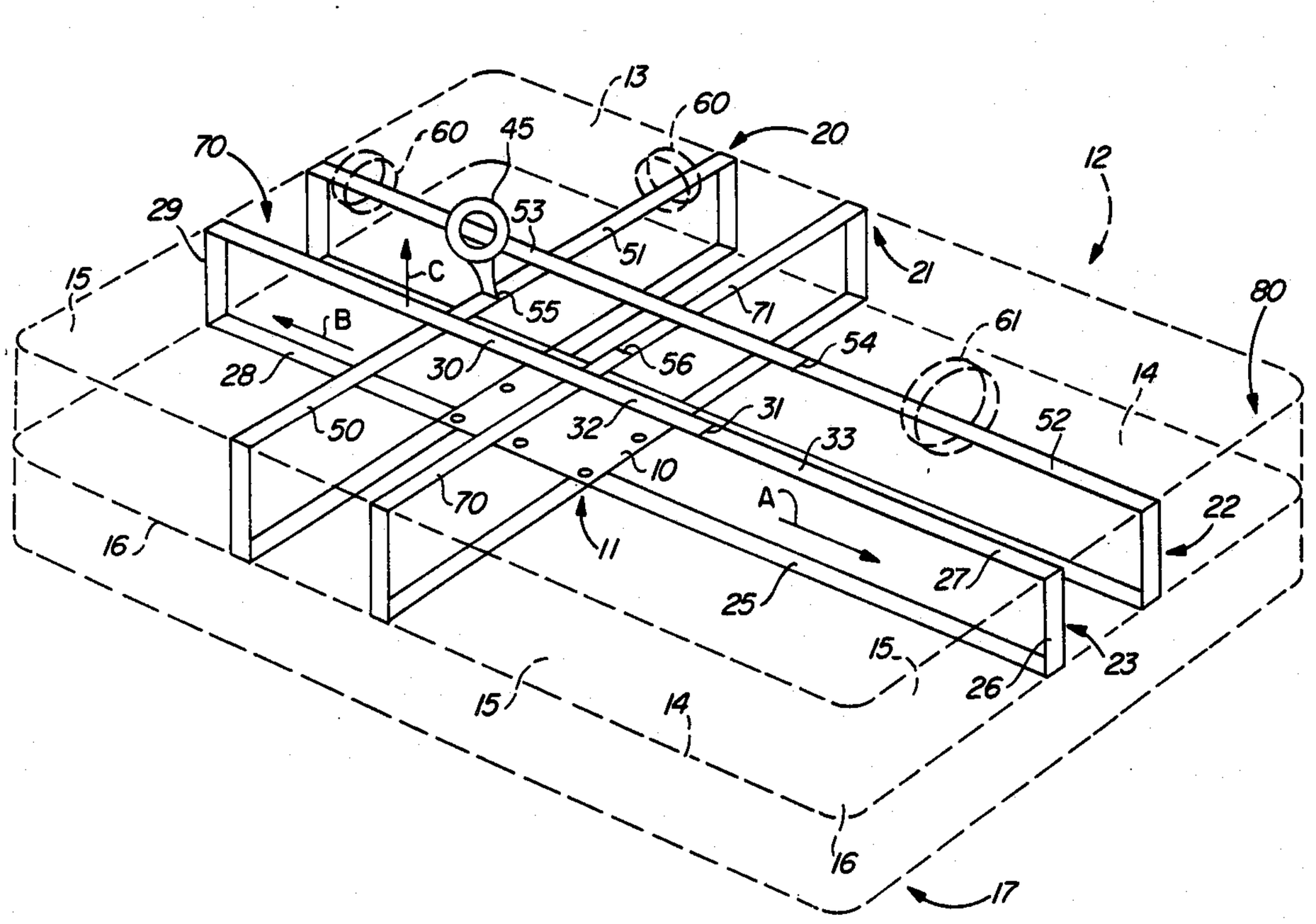


FIG-1

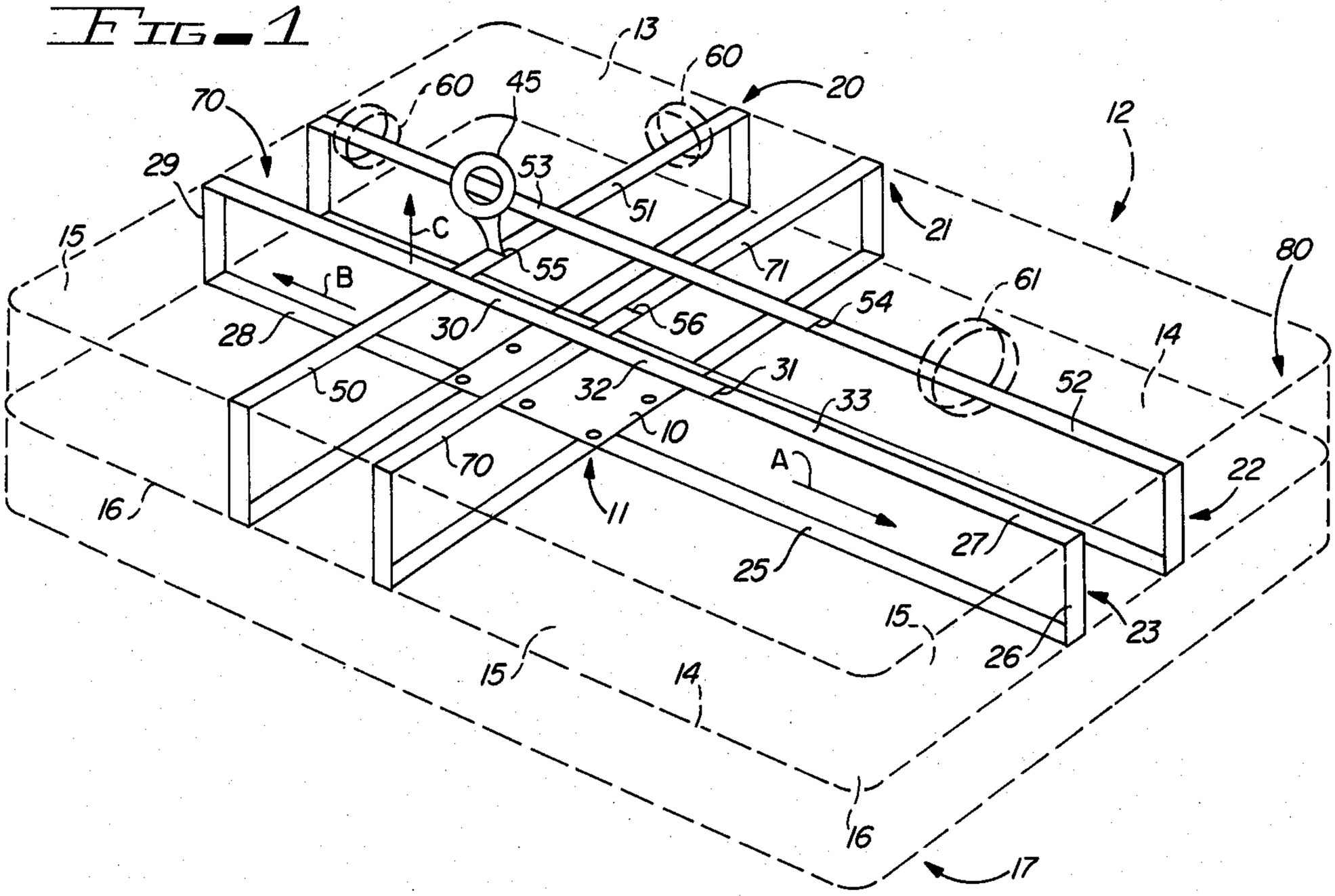
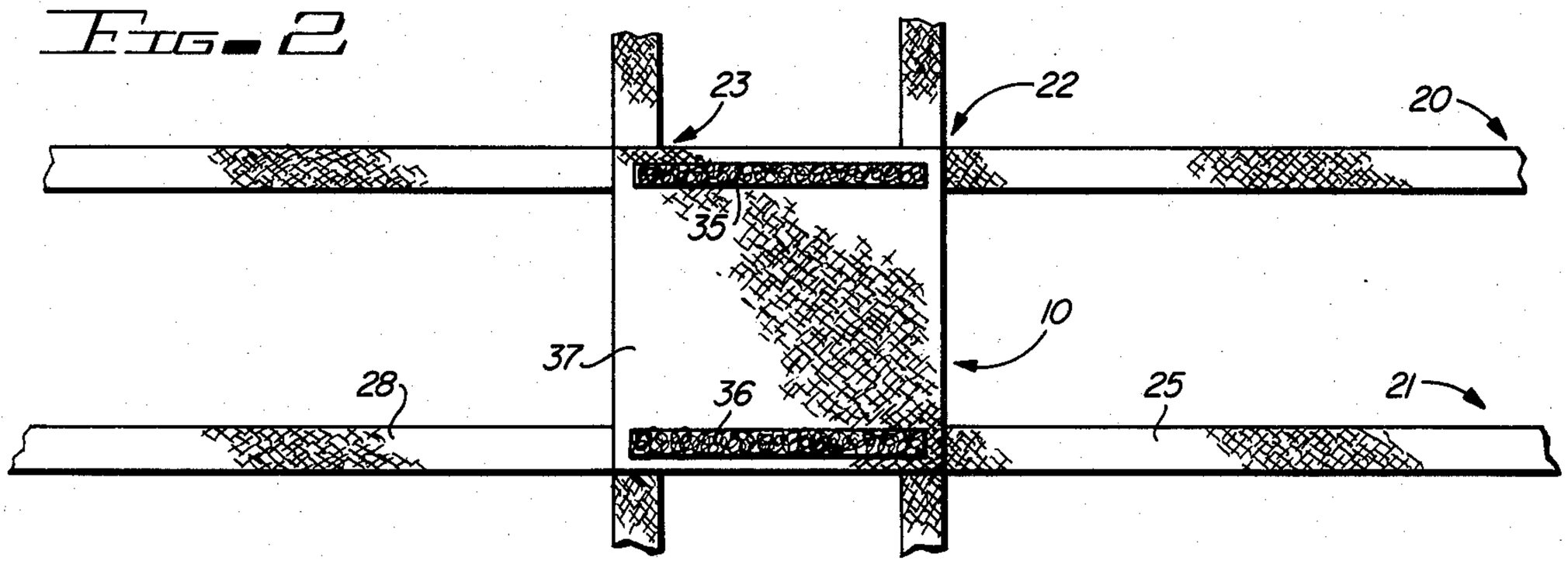


FIG-2



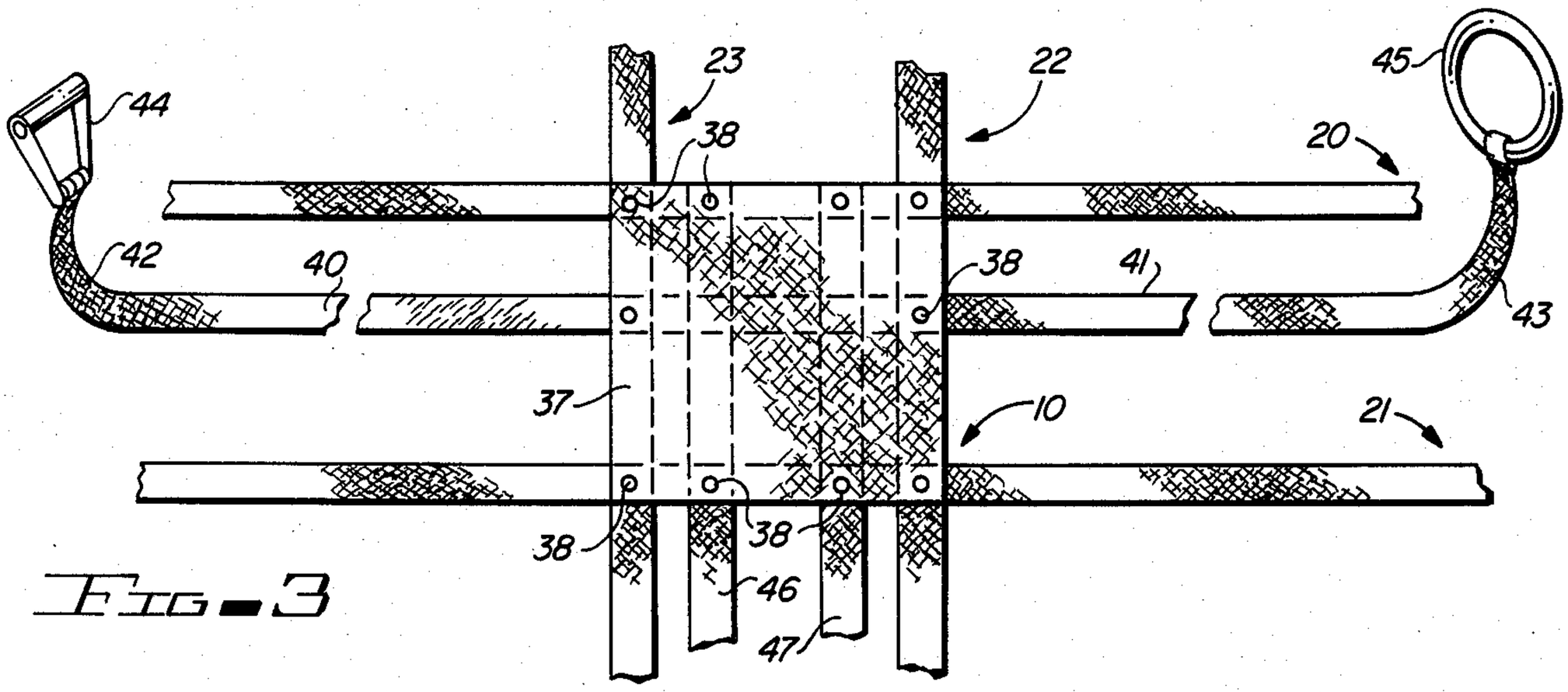


FIG-3

MATTRESS EXERCISE APPARATUS

This invention pertains to exercise apparatus.

More particularly, the invention concerns exercise apparatus which enables an individual to perform simple exercises while in bed.

In a further and more specific respect, the invention relates to exercise apparatus which can be readily installed on a mattress and utilized by an individual reclining on the mattress without requiring that the apparatus be sewn or otherwise secured to the mattress.

In another respect, the invention pertains to exercise apparatus of the type described which, when force is applied to the apparatus by an individual during use of the apparatus, tends to maintain its proper operative position on the mattress.

In a further respect, the invention relates to mattress exercise apparatus which can, without the aide of a medical attendant, often be utilized by handicapped individuals.

Periodic moderate exercise has long been recommended as one of the principal ingredients necessary for maintaining good health. When an individual convalescing in bed is unable to exercise, his muscles gradually atrophy and he is more likely to develop bed sores and become susceptible to a variety of other diseases.

One reason exercise is generally not attempted by bedridden individuals is that most conventional exercise equipment is simply not adapted or appropriate for use by bedridden patients. Since conventional exercise equipment is designed for use by completely healthy individuals, use of the equipment by convalescing individuals would require an excessive amount of exertion. Further, in many instances, particularly when handicapped individuals are involved, conventional exercise equipment cannot be utilized by a bedridden individual unless the equipment is specially adapted for use on a bed and one or more medical attendants assist the individual during use of the equipment. Adapting existing exercise equipment for a bed and providing attendants to assist in the use of the equipment is expensive and time consuming. Consequently, bedridden individuals often do not attempt to perform even the simplest of exercises.

Accordingly, it would be highly desirable to provide improved exercise apparatus which could, with little or no assistance from medical attendants, be readily installed in operative position on a bed and be utilized by bedridden individuals to perform simple exercises.

It would also be highly desirable to provide improved exercise apparatus which was of lightweight and simple construction and which could be easily utilized by handicapped persons having normal control over portions of their musculature.

Therefore, it is a principal object of the invention to provide improved exercise apparatus for use by individuals while reclining in bed.

A further object of the invention is to provide improved exercise apparatus which can, with minimal or no assistance from medical attendants, be readily utilized by bedridden individuals.

Another object of the instant invention is to provide improved exercise apparatus which is lightweight, of compact storage, and which can be quickly and conveniently installed in operative position on a bed without the use of hand tools or other equipment.

Still a further object of the present invention is to provide improved exercise apparatus which can be readily adapted for and utilized by persons of varying height and physical condition and which can be adapted to vary the resistance the apparatus provides during the performance of an exercise.

These and other, further and more specific objects and advantages of the invention will be apparent to those skilled in the art from the following detailed description thereof, taken in conjunction with the drawings, in which:

FIG. **1** is a perspective view of exercise apparatus constructed in accordance with the invention and installed in operative position on a mattress;

FIG. **2** is a top view of the exercise apparatus of FIG. **1** provided with means for fixedly securing the apparatus in position beneath a mattress; and

FIG. **3** is a top view of the exercise apparatus of FIG. **1** provided with straps having one end adapted to be manually or pedally grasped.

Briefly, in accordance with my invention, I provide improved exercise apparatus for use in combination with mattress means. The mattress means includes a generally horizontally oriented upper surface for receiving and supporting a reclining individual; a generally horizontal bottom surface; and, a peripheral side surface spanning the distance between and generally circumscribing the top and bottom surfaces of the mattress means. The bottom surface of the mattress means rests on a support surface. The improved exercise apparatus includes a pad positioned between the bottom surface of the mattress means and the support surface and elongate strap means connected to the pad and including a first strap and a second strap. The first strap includes a first segment attached to the pad and extending in a first direction between the bottom surface and support surface to the peripheral side surface; a second segment attached to the first segment and extending upwardly along the peripheral side surface; and, a third segment attached to the second segment and extending over the upper surface. The second strap includes a first portion attached to the pad and extending in a second direction between the bottom surface and the support surface to the peripheral side surface; a second portion attached to the first portion and extending upwardly along the peripheral side surface; and, a third portion attached to the second portion and extending over the upper surface. The first direction is generally opposite the second direction such that when a first force applied to the third segment in the second direction and a second force applied to the third portion in the first direction respectively cause resultant tensile forces in the first and second segments and in the first and second portions, the tensile forces in the first portion generally act in a direction opposite the tensile forces in the first segment and tend to maintain the pad between the bottom surface and the support surface.

Turning now to the drawings, which depict the presently preferred embodiments of the invention for the purpose of illustrating the practice thereof and not by way of limitation of the scope of the invention and in which like reference characters represent corresponding elements throughout the several views, FIG. **1** illustrates the presently preferred embodiment of the invention generally indicated by reference character **11** and installed on mattress **12** including upper generally horizontal surface **13**, lower generally horizontal surface **14**, and peripheral side surface **15** spanning the distance

between and circumscribing upper surface **13** and lower surface **14**. Lower surface **14** of mattress **12** is received and supported by generally horizontal surface **16** of bed spring **17**. As utilized herein, the term mattress may signify a single mattress, a plurality of stacked mattresses, a single mattress and bed spring combination, or a plurality of mattresses and/or bed springs stacked such that a mattress is at the top of the stack.

Exercise apparatus **11** includes pad **10** which is positioned between bottom surface **14** of mattress **12** and support surface **16** of box spring **17**. Straps **20–23** are attached to pad **10** and generally encircle mattress **12**. Although straps **20–23** are elastic in the presently preferred embodiment of the invention, straps **20–23** may be formed from any desired elastic or non-elastic material and, may be relatively continuous strips of material as pictured in FIG. **1**, may be comprised of pieces of material linked in the fashion of a chain, or may be otherwise formed. Straps **20–23** may be cylindrical or of any other shape and may be much wider than they are depicted in the drawings.

Strap **23** includes a first segment **25** connected to pad **10** and extending in the direction indicated by arrow A between lower surface **14** of mattress **12** and upper surface **16** of box spring **17** to peripheral wall **15** of mattress **12**. Second segment **26** of strap **23** is attached to segment **25** and extends over and along peripheral surface **15** to segment **27**. Third segment **27** is connected to segment **26** and extends over upper surface **13** of mattress **12**. First portion **28** of strap **23** is attached to pad **10** and extends in the direction indicated by arrow B between lower surface **14** of mattress **12** and support surface **16** of box spring **17** to peripheral surface **15**. Second portion **29** of strap **23** is attached to portion **28** and extends upwardly along peripheral surface **15** of mattress **12** to portion **30**. Third portion **30** is attached to second portion **29** and extends over upper surface **14** of mattress **12**. Although third portion **30** is connected to third segment **27** at seam **31** in FIG. **1**, portion **30** and segment **27** need not be connected. Instead, end **32** of portion **30** and end **33** of segment **27** could each be attached to a ring or other means which can be conveniently manually grasped. End **32** and end **33** could also each be adapted to be engaged with or connected to various parts of an individual's body.

As indicated in FIG. **1**, the portions of straps **20–23** which are positioned above surface **13** include segments **27**, **52**, **53**, **50**, **51**, **70**, **71** and **30**. Segments **50**, **51** are connected along seam **55**; and, segments **70**, **71** along seam **56**.

In FIG. **1**, pad **10** is positioned between but is not secured to bottom surface **14** of mattress **12** or upper horizontal support surface **16** of box spring **17**. When strap **23** is elasticized, it is sized so it must be partially stretched when pad **10** is positioned beneath mattress **12** and strap **23** positioned around mattress **12** as shown in FIG. **1**. When strap **23** is partially stretched as shown in FIG. **1**, the tensile force acting along segment **25** in the direction of arrow A is at least somewhat offset by the tensile force acting along portion **28** in the direction of arrow B such that pad **12** tends to remain in its operative position between mattress **12** and box spring **17**. If segment **33** or portion **30** of strap **23** is deflected upwardly in the direction of arrow C in FIG. **1** or is otherwise deflected such that the tensile forces respectively acting on segment **25** and portion **28** in the directions of arrows A and B are increased, the increased tensile forces acting in directions A and B still tend to offset one another so that pad **12** remains positioned between mattress **12** and bed spring **17**. When a plurality of elastic or non-elastic straps are attached to pad **10** as in FIG. **1**, the weight of mattress **12** against the portions of straps **20–23** sandwiched between lower surface **14** and support surface **16** develops frictional forces which tend to resist movement of the sandwiched strap portions and tend to maintain pad **10** in position between mattress **12** and box spring **17**. Similar frictional forces between pad **10** and surfaces **14** and **16** also tend to prevent pad **10** from sliding from its operative position of FIG. **1**.

The size of pad **10** can be varied as desired. The presently preferred area of upper surface **37** or of the lower surface of pad **10** is approximately four to nine square feet. The ability of pad **10** to remain in position during utilization of the exercise apparatus can be increased by simply enlarging pad **10** and thus increasing the pad surface area in contact with surfaces **14**, **16**. If the area of the upper or lower planar surface area of pad **10** were one-fourth to one-half of the area of surface **14** or **16**, the weight of mattress **12** would make it particularly difficult to displace pad **10** when any of segments **27**, **52**, **53**, **50**, **51**, **70**, **71** or **30** were being stretched or pulled during use of the apparatus.

To further anchor pad **10** beneath mattress **12**, negative Velcro strips **35**, **36** can, as shown in FIG. **2**, be attached to top surface **37** of pad **10**. Positive Velcro strips opposing strips **35**, **36** would be attached to bottom surface **14** of mattress **12**. Velcro strips could similarly be attached to the bottom surface of pad **10** and to surface **16** of bed spring **17**. In place of Velcro, snaps **38** could, as shown in FIG. **3**, be attached to upper surface **37** of pad **10**. Mates for snaps **38** would be secured to bottom surface **14** of mattress **12**. Snaps and mates for the snaps could be similarly provided for the bottom surface of pad **10** and surface **16** of bed spring **17**. Any other desired attachment means could be utilized to permanently secure or detachably fixedly secure pad **10** to surface **14** and/or **16**.

In FIG. **3**, pad **10** is provided with additional straps **40**, **41** which each extend from pad **10** between mattress **12** and box spring **17** to peripheral surface **15** and extend upwardly along surface **15** and over upper surface **13** of mattress **12**. Ends **42**, **43** of straps **40**, **41** are positioned over surface **13** and provided with manual grasps **44**, **45**. Straps **46**, **47** extend from pad **10** in a direction generally parallel to straps **22**, **23**. Although not shown in FIG. **3**, straps **46**, **47** extend to peripheral surface **15**, upwardly along surface **15** and over upper surface **13** of mattress **12**. The ends of straps **46**, **47** positioned over surface **13** are attached to stirrups into which an individual's feet can be inserted. Once an individual's feet are inserted in the stirrups, he can attempt to bend his knees and pull the stirrups toward his chin.

In use, after pad **10** and straps **20–23** are positioned on mattress **12** as shown in FIG. **1**, an individual reclines on mattress **13** either on or beneath the portions of straps **20–23** positioned above surface **13** of mattress **12**. The head of the individual is on upper end **70** of mattress **12** while his feet are on lower end **80** of mattress **12**.

When an individual is positioned on top of the portion of straps **20–23** located over surface **13** he can grasp portions **50**, **51** of strap **20** with his hands and pull strap **20** upwardly away from surface **13** to exercise his arm and back muscles. He can also slide one foot between segment **27** and mattress **12** and his other foot between segment **52** and mattress **12**. After his feet are beneath segments **27**, **52**, he can, to exercise his leg muscles,

attempt to lift his feet upwardly against the resistance supplied by straps **22, 23**.

If an individual were to position himself between straps **20–23** and mattress **12**, he could similarly grasp or wrap his hand, wrist, ankle or foot around one of continuous straps **20–23** and attempt to move his arms or legs in a direction which would be resisted by the straps. Once an individual is positioned above or beneath the portions of straps **20–23** which are over surface **13**, grasping or engaging the straps normally requires very little effort on the part of the individual.

In FIG. **3**, the ends of straps **40, 41** are provided with manually grasped rings **44, 45**. The ends of straps **40, 41**, or any portion of any of the other strap segments positioned above surface **13**, can be adapted to fit around or engage any body member. For instance, in FIG. **1**, loop **60** attached to strap **22** is sized to receive the forearm of a person while loop **61** is sized to receive the leg of an individual. Any of strap portions **42, 43, 50, 51, 70, 71, 27, 30, 52, 53** could be adapted to detachably engage an individual's waist, chest, neck, head, etc.

In FIG. **1**, straps **20–23** completely span upper surface **13** of mattress **12**. As indicated in FIG. **3**, pad **10** can be provided with straps **40, 41** which do not completely span surface **13** but have a free end **42, 43** which lies on surface **13**. When a strap does not completely span surface **13**, the length of strap on surface **13** depends on factors such as how the end of the strap is adapted to engage an individual's body, the particular portion of an individual's body intended to engage the strap, and the size of the person utilizing the exercise apparatus.

To facilitate the adapting of the exercise apparatus of the invention to mattresses and individuals of differing size, the apparatus can be provided with a plurality of straps which could be readily connected to and detached from pad **10**. Straps of differing lengths and elasticity can be included. Rings, fabric loops and other body engaging means which can be readily connected to and removed from the straps at various points along their lengths can also be provided. Some of the straps would be intended to completely encircle a mattress as do straps **20–23** in FIG. **1**. Other straps would have one end connected to pad **10** and the other free end positioned on top of surface **13** of mattress **12**.

Pad **10** can be constructed to be folded into and secured in different sized configurations so that the amount of surface area between pad **10** and mattress **12** can be adjusted. Means can be provided for adapting pad **10** and mattress **12** or box spring **17** so pad **10** can be detachably fixedly secured thereto.

Having described my invention in such terms as to enable those skilled in the art to understand and practice it, and having identified the presently preferred embodiments thereof, I claim:

1. In combination with a bed including
a mattress including
a generally horizontal upper surface for receiving and supporting a reclining individual,
a generally horizontal bottom surface, and
a peripheral side surface spanning the distance between and generally circumscribing said top and bottom surfaces,
a support surface beneath and contacting said bottom surface of said mattress,
exercise apparatus including
(a) a pad positioned between said bottom surface of said mattress and said support surface and including an upper surface contacting said bottom surface of said mattress, the area of said upper surface of said pad being less than the area of said bottom surface of said mattress, and
(b) elongate strap means connected to said pad and including
(i) a first strap including
a first segment attached to and extending from said pad in a first direction between said bottom surface and said support surface to said peripheral side surface,
a second segment extending upwardly along said peripheral side surface, and
a third segment extending over said upper surface,
(ii) a second strap including
a first portion attached to and extending from said pad in a second direction between said bottom surface and said support surface to said peripheral side surface,
a second portion extending upwardly along said peripheral side surface, and
a third portion extending over said upper surface,
(iii) a third strap including
a first segment attached to and extending from said pad in a third direction between said bottom surface and said support surface to said peripheral side surface,
a second segment extending upwardly along said peripheral side surface, and
a third segment extending over said upper surface, and
(iv) a fourth strap including
a first portion attached to and extending from said pad in a fourth direction between said bottom surface and said support surface to said peripheral side surface,
a second portion extending upwardly along said peripheral side surface, and
a third portion extending over said upper surface;
said first direction generally being opposite and parallel said second direction;
said third direction generally being opposite and parallel said fourth direction,
said third and fourth straps being generally perpendicular to said first and second straps and said third and fourth directions being generally perpendicular to said first and second directions;
an individual utilizing said exercise apparatus by reclining on said upper surface of said mattress and utilizing
a portion of his body to engage and
outwardly displace away from said upper surface,
or
pull on
at least one of
said third segment of said first strap,
said third portion of said second strap,
said third segment of said third strap, and
said third portion of said fourth strap,
at least one of said third segments and third portions includes handle means which enable said individual to manually grasp said handle means and pull on said one of third segments and third portions.

2. The combination of claim **1** wherein at least one of said strap segments and portions is elastic.

3. The combination of claim **1** wherein at least one of said straps is elastic.

4. The combination of claim **1** wherein said pad is adapted to be folded into and secured in each of a plu-

rality of configurations, said area of said upper surface of said pad differing in each of said configurations.

5. The combination of claim 1 wherein at least one of (a) a first pair comprising said third segment of said first strap and said third portion of said second strap, and (b) a second pair comprising said third segment of said third strap and said third portion of said fourth strap, is interconnected and spans said upper surface of said mattress.

6. The combination of claim 5 wherein at least one of said first and second pair includes handle means adapted to permit an individual to grasp said handle means and pull on said one of said first and second pair.

7. The combination of claim 6 wherein said pad includes means for fixedly detachably securing said pad to at least one of said bottom surface of said mattress and said support surface.

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